SCHOOL GARDENS: HELPING STUDENTS UNDERSTAND WHERE FOOD COMES FROM TO BREAK DOWN BARRIERS TO HEALTHY FOOD

by
Cassidy Francik

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Abstract

Within the United States, food insecurity is adversely affecting urban households, households with children, and minority households (Coleman-Jensen, Gregory, & Singh, 2016). To overcome these disparities and fill the hunger gap, urban residents are turning to urban agriculture. This paper focuses on one initiative of urban agriculture: school gardens. Building from the successes of other urban agriculture initiatives – established knowledge of where food comes from and understanding of intent for projects – I queried the literature with these two questions: 1. how are schools using school gardens; and, 2. Do school gardens help students understand where food comes from?

Through a systematic literature review of 26 articles on school gardens from 2000 to 2017, it was found that school gardens are most commonly used to promote healthy eating behaviors, improve nutritional knowledge, and enhance academic performance. Additionally, the understanding of where food comes from served as a theoretical framework for which much research was built upon. However, none of the studies measured for students' understanding of where food comes from.

I then used these findings as well as knowledge gained from case studies of established school gardens in Western United States to make recommendations to city planners for Baltimore City, MD. Baltimore is experiencing significant food access inequities (Buczynski, Freishtat, & Buzogany, 2016). By appropriately soliciting the help of stakeholders and community members, while considering the needs and wants of those who will directly benefit – students and their families – school gardens can be instrumental tools that will serve as resource multipliers for declared food deserts.

Table of Contents

Introduction & Background Information

FOOD SECURITY

From production to consumption, the food system is built to alleviate hunger. To meet the needs of the growing world population, food production has intensified, multiplied, and concentrated since the industrial age (Sage, 2012). With a working food system, we experience food security. However, the global food system is not meeting the world's needs.

Approximately half of the world's population does not eat a nutritious diet according to Robert Townsend's 2015 report, "Ending Poverty and Hunger by 2030: An Agenda for the Global Food System." As mentioned above, 12.7% (15.8 million) of U.S. households did not have access to healthy food options at some point in time during 2015 (Coleman-Jensen, Gregory, & Singh, 2016). This rate increased for households within major metropolitan cities, where 14.1% of households experienced one or more individuals being unable to eat healthy because of insufficient funds and/or they lacked necessary resources to access food (Coleman-Jensen, Gregory, & Singh, 2016). Moreover, 16.6% of households with children under the age of 18 experienced food insecurity. Typically, adults will alter their eating habits to ensure children do not suffer shield children from the effects of food insecurity. However, 1 or more children were affected in 7.8% of the households with children experiencing food insecurity during 2015 (Coleman-Jensen, Gregory, & Singh, 2016). Food insecurity is significantly greater among households headed by Black, Non-Hispanics, and Hispanics, with 21.5% and 19.1%, respectively, affected across the United States (Coleman-Jensen, Gregory, & Singh, 2016). It is important to note there has been a significant decrease in food insecure households compared to 2014 when 14% of households experienced food insecurity. (Coleman-Jensen, Gregory, & Singh, 2016). Despite this decrease, food insecurity remains a pervasive problem for which creative solutions need to be explored.

Another trend to note is the growing urban population. More than half the world's population, 54.5%, lives in urban areas (United Nations, 2016). This statistic is much larger in the United States where urban areas are home to more than 80% of the nation's population (World Health Organization, 2016). Cities have long faced difficulties in providing food for all. Supermarkets and grocery stores are supplemented and even replaced, by corner stores and fast-food chains, which have been found to not meet a community's nutritional needs (Walker, Keane, & Burke, 2010). In fact, corner stores and fast-food chains are more common in low-income communities (Hendrickson, Smith, & Eikenberry, 2006; Childs & Lewis, 2012), further contributing to detrimental health effects as experienced by individuals of low economic status and minorities (Walker, Keane, & Burke, 2010). More generally, cities are becoming more vulnerable to changing climates because of dense populations, dated infrastructure, and the high dependence on energy and natural resources. In order to increase resiliency, cities are emphasizing sustainability planning by balancing economic, environmental, and equity goals.

FOOD DESERTS AND FOOD INEQUITY

The current discourse of food insecurity focuses on food deserts. Food deserts are identified as areas where healthy food is difficult to obtain due to affordability, availability, and/or other limiting accessibility factors such as transportation. Food deserts not only concern food security issues, but also social and environmental justice issues (Sage, 2012). In 2016, Lawrence Brown released his research, "The White L vs. the

Black Butterfly," featuring the study of historically racist housing practices in Baltimore and how these *de facto* and *de situ* practices led to the distribution of current resources as well as neighborhood demographics (Brown, 2016). He revealed glaring patterns of disparity and inequity. These findings apply to Baltimore's food landscape, specifically to the location of food deserts and the limited access to healthy food options (Brown, 2016). Not directly related, but indirectly supporting Brown's theory, the Baltimore's Office of Sustainability released the "2015 Food Environment Map" around the same time as Brown's research. Equally troubling, the research concluded 1 in 4 Baltimore residents live in a food desert (Buczynski, Frieshtat, & Buzogany, 2016). Affected to an even greater extent are African Americans residents and children. Thirty-five percent of African Americans and 30% of children live in food deserts in Baltimore (Buczynski, Frieshtat, & Buzogany, 2016).

URBAN FOOD FOCUS

Acknowledging these disparities and recognizing the need, cities are prioritizing feeding every person. Not every person regards food as a necessity though. Many researchers are finding food being thought of as a commodity (Valpreda & Zonda, 2016; Ackerman, et al., 2014; WinklerPrins, 2017). This way of thinking is leading to an intellectual and emotional disconnection from the food system, which adds to the physical disconnection experienced by limited food options and explored in the metabolic rift theory. According to the metabolic rift theory, capitalism and urbanization have removed people from the environment (Ackerman, et al., 2014). Urban agriculture works to mitigate the effects of this disconnection from nature and the resources we depend upon on, such as food, on three levels: ecological, social, and individual (Ackerman, et al., 2014; WinklerPrins, 2017). Ecologically, urban agriculture reduces the size of the nutrient cycle (Ackerman, et al., 2014; WinklerPrins, 2017) by bringing energy closer to the consumer; thereby, urban agriculture reduces energy spent on transporting food from distance places. It also acts to recycle waste as compost, reducing dependence on harmful chemical fertilizers (Ackerman, et al., 2014). Socially, urban agriculture works to build community (Ackerman, et al., 2014) as well as a sense of self-efficacy through individuals' contributions to the community needs (WinklerPrins, 2017). This sustainable approach has led to urban agriculture growing in popularity.

Urban agriculture is working to supplement city initiatives and fill the hunger gap. One such form of urban agriculture that has demonstrated positive effects on city neighborhoods within the United States is community gardens. As seen in a case study of Baltimore, MD, gardens improve community member's awareness of the food system and their interaction with the food system (Corrigan, 2011). Gardens instill a sense of pride among participants (Corrigan, 2011) as they learn to provide fresh fruit and vegetables for their family and neighbors as well as make donations to local organizations (Corrigan, 2011). Finally, the case study found gardens help to maintain and promote cultural practices and intergenerational interactions (Corrigan, 2011). Overall, community gardens serve the participants and surrounding community by providing food and reinforcing healthy eating habits, possibly contributing to the economy through sales and jobs, and promoting cultural education, civic engagement, and community development (Gray, Diekman, & Algert, 2017).

SCHOOL GARDENS

Schools are a large part of communities in urban areas. Despite being similar in concept to community gardens, school gardens have not been utilized in the same way. Most recently, school gardens have served the purpose of educating youth in nutrition (Davis, Spaniol, & Somerset, 2015). Additionally, they have been found to enhance student's academic performance and supplement core curriculum (Blair, 2009; Williams & Dixon, 2013).

The prevalence of school gardens has waxed and waned during much of United States' history beginning in the nineteenth century (Subramaniam, 2002; Gray, Diekman, & Algert, 2017). In the 1890s, school gardens were introduced to the United States education landscape as a beautification scheme for urban schools. During both World War I and World War II, school gardens were transformed from aesthetically pleasing projects to being a resource in addressing food insecurity (Subramaniam, 2002). The number of school gardens decreased, after both wars, as political and social climates steadied. This oscillating pattern continued until the late 2000s (Graham, 2005; Subramaniam, 2002; and, Williams & Dixon, 2013). Schools gardens have since been gaining steady ground in response to the No Child Left Inside Coalition in addition to the country's need to address increasing childhood obesity rates (Blair, 2009; Graham, 2005; Lineberger & Zajicek, 2000; Stewart, Purner, & Guzman, 2013; and, Williams & Dixon, 2013).

A majority of research completed on school gardens has focused on how supplemental, garden-based learning is integrated into curricula based on two educational theories, the Social Cognitive Theory and experiential learning (Blair, 2009; Graham et al., 2005; Moore et al., 2015; Ozer, 2007; Skelly & Bradley, 2000; Stewart, Purner, &

Guzman, 2013; Subramaniam, 2002; and, Williams & Dixon, 2013). Researchers have also asked the following questions: which subjects has curricula been matched to; what resources are used; and, what implementation components make for a successful and well-maintained school garden. As of 2009, it has been reported that eleven states have created and aligned garden curricula with state standard subject area curricula (Blair, 2009; Graham et al., 2005; Moore et al., 2015; Skelly & Bradley, 2000; Stewart, Purner, & Guzman, 2013; and, Williams & Dixon, 2013). Furthermore, stakeholders and garden promoters have recognized eight cities – Berkeley, Boston, Chicago, Denver, Houston, Portland, San Francisco, and Santa Cruz –for implementing strong school garden curricula programs (Blair, 2009; Graham et al., 2005; Stewart, Purner, & Guzman, 2013; and, Williams & Dixon, 2013). Subject areas that garden curricula have been matched to are as follows: environmental studies/education, health and nutrition, language arts, math, science, and social studies curricula (Blair, 2009; Graham et al., 2005; and, Williams & Dixon, 2013). In order to implement school gardens, many schools have had to tap private funding sources, volunteer time, and local expertise. The successful school garden programs have all featured a strong sense of responsibility among staff members and student participants, community collaboration, and curricula integration (Blair, 2009; Graham et al., 2005; Hazzard et al., 2011; Stewart, Purner, & Guzman, 2013; and, Williams & Dixon, 2013).

Having well-designed curricula, exemplary programs, and documented best practices and expected barriers help schools implement school gardens. However, it's imperative to understand how school gardens are being implemented to ensure that the foundational knowledge available is still applicable to the schools' needs, and thus preparing schools for successful programs. Furthermore, as cities continue to move towards sustainable infrastructures including a sustainable food system, it's important to determine if school gardens improve students' understanding of where food comes from as this knowledge will be useful in future years to implement and maintain sustainable systems. Therefore, I am focusing on two questions for this literature review: 1. how are schools using school gardens; and, 2. Do school gardens help students understand where food comes from?

Methods

To understand how school gardens are being used and the degree to which school gardens help students understand where their food comes from, I conducted a systematic review of literature searching the keywords "school gardens," "garden-based learning," "impact," and "benefits." These terms were chosen based on the articles read during my initial search and were kept general to best understand the various way school gardens are being used. Based on the historical context and the growing presence of school gardens, I reviewed literature between 2000 and 2017. To conduct this systematic literature review, I used the "Methodologically Inclusive Research Synthesis (MRIS) framework" put forth by Suri and Clarke in the 2009 study, "Advancements in Research Synthesis Methods: From a Methodologically Inclusive Perspective," and used by Williams and Dixon in their 2013 study, "Impact of Garden-Based Learning on Academic Outcomes in Schools: Synthesis of Research Between 1990 and 2010." Williams and Dixon presented a strong argument for using this particular systematic review method, stating that school gardens bolster interdisciplinary studies, therefore an analysis of the effectiveness of school gardens should be inclusive of a variety of viewpoints (Williams & Dixon, 2013). This framework informed my systematic review, which was conducted in six stages: 1. Conduct an initial search, across applicable databases, which included Academic Search Complete, Web of Science, and Google Scholar; 2. Analyze subset of initial studies and build matrix for criteria of inclusion for this particular study; 3. Analyze abstracts of remaining articles to determine those applicable to this study; 4. Build an article summary template to record in-depth analysis; 5. Analyze subset of experimental studies to build a subset synthesis matrix in order to determine how gardens are being used; 6. Review all included articles, record summaries, and translate findings to synthesis matrix.

Following these steps and using Johns Hopkins Library catalyst, the initial searches of Academic Search Complete, Web of Science, and Google Scholar resulted in 273 unique articles. I removed the repeat articles and then reviewed an initial subset of articles to determine inclusion criteria. Studies were included if they: i. Focused on the United States; ii. Examined in-school or after-school gardens; and iii. Were either qualitative, literature reviews or quantitative studies. Using these inclusion criteria, all remaining abstracts were reviewed to determine if the study would be included in my research, and short citations of included articles were recorded in the summary data table. After an in-depth review of a few studies, I built a subset synthesis matrix to analyze the quantitative studies to determine how school gardens are being used. Based on the conclusions shared in the first few studies, the synthesis matrix initially included five ideas as to how school gardens were being used: 1. Enhance academic instruction; 2. Teach environmental education; 3. Teach nutritional awareness; 4. Promote a sense of self and community; and 5. Provide experiential learning opportunities. Four additional ideas were added to the matrix once all reviews were complete.

Results

Based on the inclusion criteria, 33 articles were identified for review. Ultimately, 26 articles were reviewed in-depth to address the two research questions: 1. how are school gardens being used? 2. Do school gardens help students understand where food comes from? The remaining 7 articles reviewed from the database search were used to inform the introduction and future research.

Of the 26 articles, 16 were quantitative. These quantitative articles were summarized and examined to determine how school gardens were being used. Almost a majority (7) of the quantitative studies were quasi-experimental, with one true experiment. The remaining quantitative studies were voluntary surveys (6), and interviews accompanied by observations (2). The most common variable measured for was fruit and vegetable preference (Lineberger & Zajicek, 2000; Morris & Zidenberg-Cherr, 2002: Parmer et al., 2009; Gatto et al., 2012; Nolan et al., 2012; Roche, Kolodinsky, Johnson, Pharis, & Banning, 2017) and reason for use (Skelly & Bradley, 2000; Graham & Zidenberg-Cherr, 2005; Hazzard et al. , 2011; Scherr et al., 2013; Turner et al., 2016). Other variables measured for were fruit and vegetable intake (McAleese & Rankin, 2007), nutritional behaviors (Graham et al. 2005), nutritional knowledge, implementation barriers (Graham et al., 2005), science knowledge (Hilgers, Haynes, & Olson, 2008; Wells, et al., 2015), and best practices (Graham et al., 2005; Hazzard et al., 2011). From these studies, there were 9 different uses identified, in order of commonality: 1. Teach nutritional awareness; 2. Enhance academic instruction; 3. Teach environmental education; 4. Promote a sense of self and community; 5. Improve knowledge of gardening; 6. Provide experiential learning opportunities; 7. Encouraged by the administration and district; 8. Provide extra-curricular activities; 9. Produce food. Half of the quantitative studies found that school gardens were used for one of more of the above reasons.

The remaining 10 articles were review articles based on secondary data. These were used to supplement the findings from the quantitative studies. In these articles, 7 components of school gardens were identified, in order of commonality: 1. the use of school gardens to improve fruit and vegetable preferences (Robinson-O'Brien, Story, & Heim, 2009; Langellotto & Gupta, 2012; Berezowitz, Bontrager Yoder, & Schoeller, 2015; Davis, Spaniol, & Somerset, 2015); 2. School garden best practices and barriers (Ozer, 2007; Nowak, Kolouch, Schneyer, & Roberts, 2012; Turner et al., 2016); 3. The use of school gardens to enhance academic instruction (Blair, 2009; Williams & Dixon, 2013); 4. The use of school gardens to build awareness of positive nutritional behaviors (Davis, Spaniol, & Somerset, 2015); 5. The use of school gardens to improve nutritional knowledge (Robinson-O'Brien, Story, & Heim, 2009); 6. The use of school gardens to promote a positive attitude towards fruit and vegetables (Williams & Dixon, 2013); and 7. The use of school gardens to help students understand where food comes from (Nowak et al., 2012). The last component of school gardens was not supported with measured outcomes, but rather a conclusion based on observations of how school gardens are being implemented on three levels: personal, school-wide, and community-wide.

When examining the articles for the second question, “do school gardens help students understand where food comes from,” only one review article, as identified above, recorded this response. One study recorded parents noticing an increased interested and “improved ability” to determine living, whereas students demonstrated no improved interest in origins of living matter or the names of plants (Hilgers et al., 2008). While this is not a direct contradiction, as it does not measure understanding of food origins, it is something that should be further studied. In turn, a more recent study that measured the psychosocial factors of garden-enhanced nutrition education on Latino youth in Los Angeles, CA, found students to have a more positive reaction towards gardening, stating it was “easy.” This attitude was supported by improved post-intervention measures of students’ preference for vegetables. These results were statistically significant when compared to a group of peers who did not receive the garden-enhanced programming (Gatto et al., 2012). Also, noted above, many of the articles that studied improved nutritional awareness and fruit and vegetable preference made the assumption that having hands-on experience with the growing process of food builds an understanding of where food comes from. While this was used as an underlying theoretical framework from which to build hypotheses, it was not directly measured.

Discussion

As demonstrated by the results above, school gardens have been most commonly implemented in order to reinforce nutritional knowledge and healthy eating behaviors. This matches current needs and trends as the nation is facing an obesity epidemic (Imes & Burke, 2014), and schools serve as a direct means to combat childhood obesity. During the Obama presidency, First Lady Michele Obama focused her platform on childhood obesity, helping to implement fitness and healthy eating programs within schools across the nation (The White House, n.d.). Vending machines and sugary drinks were removed from school premises and school meals were revamped to reflect the recommended servings of fruit and vegetables (CBS, 2013). It has been shown that having school gardens enhances nutritional education and reinforces these changes by improving knowledge as well as preference for vegetables (Berezowitz, Bontrager Yoder, & Schoeller, 2015). Improved preference for fruits was not demonstrated, however, researchers recorded high pre-test preference values for tested fruits (Lineberger & Zajicek, 2000). This finding led to later researchers forgoing the monitoring of fruit consumption and solely focusing on vegetable consumption.

Another prominent use of school gardens is to enhance academic instruction. This comes as no surprise given the nation's focus on student achievement and standardized tests. While further research should be done to increase experimental rigor and improve validity, research has demonstrated that school gardens produce improved educational outcomes for students by providing relevant experiences to complement classroom instruction (Graham et al., 2005; Williams & Dixon, 2013). Improved student behavior – an indicator of strong student performance – has been observed as well (Williams & Dixon, 2013).

Without being able to survey schools with school gardens, determining how school gardens are being used is dependent upon the research being produced. During the early 2000s, research on school gardens focused on teacher and administrator perceptions of school garden implementation (Skelly & Bradley, 2000; Graham & Zidenberg-Cherr, 2005, Graham et al., 2005) as well as whether or not school gardens promoted healthy eating habits (Lineberger & Zajicek, 2000). Between 2009 and 2013, schools were monitored for best practices (Hazzard et al., 2011) and improved student achievement. Research also dove deeper into healthy eating habits by examining the degree of efficacy to which school gardens improve actual consumption of fruits and vegetables (Parmer, Salisbury-Glennon, Shannon, & Struempler, 2009; Gatto et al., 2012). Most recently, research is now focusing on how school gardens can enhance STEM knowledge (Wells, et al., 2015) and coupling the earlier effects seen by asking dual questions of whether or not school gardens improve health literacy while maintaining student achievement (Berezowitz, Bontrager Yoder, & Schoeller, 2015). Finally, research has begun to explore school gardens with an equity lens (Stewart, Purner, & Guzman, 2013; Meek & Tarlau, 2016). Meaning, researchers are surveying the demographics of students and communities where school gardens are found and observing how perceptions and benefits differ for students of low economic status (Gatto et al., 2012; Cairns, 2017).

Overall, research on school gardens excludes the question, "do school gardens help students understand where food comes from?" I found that much of the research reviewed for this particular study is built upon the assumption that school gardens improve student's understanding of subjects, whether they be science, nutrition, or the environment, by providing hands-on learning opportunities, which are found to increase retention of acquired skills and knowledge. Improving student achievement and nurturing healthy children are core to the functions of schools. Therefore, it makes sense for researchers to focus as they have.

LIMITATIONS

Additional limitations found, separate from the fact that school garden research from 2000 to 2017 does not directly address the question of whether or not school gardens help students understand where food comes from, was the rigor in which quantitative studies were completed. As mentioned, most quantitative studies were quasi-experimental and therefore lacked randomization, undermining the validity of the findings. Furthermore, most research, besides the review articles, had limited sample sizes and was exposed to statistical groupings based on classroom functionality. Acknowledging these limitations were due to the environment for which school gardens are found, it's important for future research to expand sample size to produce more statistically significant results. One study monitored dosage and found it to be a dependent variable in determining students' preference for vegetables and improved nutritional knowledge (Wells, 2015). Therefore, the lack of monitored dosage – meaning how often and how long were students exposed to the garden – and fidelity of instruction can be seen as a confounding variable for many of the studies. Additionally, research needs to be diversified, as much of the research identified and examined for this study took place on the west coast and in prominently Caucasian neighborhoods (Turner et al., 2016). Resources distributed and identified by these studies included garden instructors as well as regularly involved parents and guardians. Such resources may be difficult to secure in under-resourced urban areas.

SCHOOL GARDENS AND BALTIMORE

A major limitation for this portion of this study was the inability to speak to representatives leading the Green Schools initiative in Baltimore. Therefore, these recommendations are based on knowledge of the current Baltimore City Public School system, general findings as to how school gardens are being used, what key components are necessary for success, what resources are available to overcome identified barriers seen by schools with gardens, and what success has Baltimore already seen in the way of urban agriculture.

In partnership with the Johns Hopkins Center for a Livable Future, the Baltimore Food Policy Initiative created the "2015 Food Environment Map" (Buczynski, Frieshtat, & Buzogany, 2016) in order to identify priorities and inform food-access strategies to be implemented by the City of Baltimore. The Department of Planning's Office of Sustainability is leading many of these strategies. Currently, as part of the Green Schools Initiative put forth by Baltimore's Office of Sustainability, Baltimore City Public Schools may earn their Green School certification by implementing green strategies, including starting and maintaining a school garden (Office of Sustainability, 2016).

However, Baltimore City Public Schools is facing a $130 million budget gap for the 2017-18 school year (Santelises, 2017). Unfortunately, this is expected to result in teacher lay-offs and elimination of enhanced programs for schools (Santelises, 2017). While limited funds have been identified as a barrier to school gardens, it's important for administrators to consider their return on investment. School gardens not only improve students' academic performance and nutrition knowledge, they also have been found to improve students' sense of self-efficacy, behavior, and confidence (Gray, Diekman, & Algert, 2017). Outside of the student, school gardens promote community and responsibility (Gray, Diekman, & Algert, 2017).

Learning from community garden research, it may be beneficial for schools to approach the idea of implementing a school garden as a grassroots project. Students should be involved in the garden from the start. As seen with the case study of the Duncan Street Miracle Garden, one study on school gardens found the garden was more instrumental and successful for students when the students were involved in the planning process (Nowak et al., 2012). Furthermore, engagement from teachers, parents and guardians, and community volunteers have been identified as important components that need to be considered and evaluated before starting a school garden (Hazzard et al., 2011). To ensure projects are not only maintained but are able to grow, sustainability plans should be presented before breaking ground. To manage these various planning stages and key stakeholders, school administration and/or garden program managers need to have a network of support. Ideally, this network would consist not only of formal, institutional stakeholders but also local, skilled community members.

It is my belief that this network can come from the larger community of Baltimore. Baltimore is a homegrown city. City residents take pride in their residential tenure and their cultural heritage. And, Baltimorean's pride has been demonstrated by the many strong urban agriculture initiatives happening within the city such as the Duncan Street Miracle Garden and the Whitlock Community Farm. Urban agriculture initiatives led by Baltimore's Office of Sustainability include the Growing Green Initiative, Homegrown Baltimore, the Food Policy Initiative, and the Green Schools Initiative.

As part of the "Mapping Baltimore City's Food Environment: 2015 Report," a 2015 Homegrown Baltimore Food Access Map was created. From this map, you can identify approximately 65 community gardens scattered about the city, and 15 urban farms (Buczynski, Freishtat, & Buzogany, 2016). Many of these urban agriculture sites are located within boundaries, or close proximity, to identified food deserts (Buczynski, Freishtat, & Buzogany, 2016). Knowing Baltimore is experiencing above average food insecurity (Buczynski, Freishtat, & Buzogany, 2016), I believe there is untapped potential within the city's homegrown initiatives. Community gardens and urban farms can help start and support school gardens. Not only would these various levels of urban agriculture help to provide healthy food in food deserts, they can also help residents access the economy through the sale of produce and the creation of jobs. Furthermore, these various levels of urban agriculture will further our efforts to become a green, sustainable city.

Support from the City of Baltimore, specifically Baltimore's Office of Sustainability is crucial in establishing, maintaining, and growing school gardens within Baltimore City Public Schools. While the Office of Sustainability has recognized the need to have an evolving sustainability plan, as recently demonstrated by their efforts to involve the community in various forums, committees, and events to determine the updated sustainability plan, many of these projects require reformed policies and are therefore happening in a top-down approach. For Baltimore to see the full potential of these many initiatives, we must directly involve residents affected, especially the children as they are disproportionately affected and many receive a majority of their meals through school.

FUTURE RESEARCH

Despite the question, "do school gardens help students understand where food comes from," not being addressed, it is important to return to the roots of the school garden concept. One of the initial reasons for implementing school gardens was to provide food. This intent innately improved students' understanding of where food comes from. As a key resource to the community, schools provide for the students as well as the families and surrounding community members. In under-resourced urban areas, schools provide a majority of the meals for students and serve as a resource bank for food pantries or other food distribution services (Roche et al., 2017). Not to mention, children's social cognition and habits are formed in school. By promoting a sense of community, self-efficacy, and empowerment, schools can foster a healthier and more sustainable community. And, school gardens can be a key component to a school's connection with the community. The evolving research lens on school gardens – most recently focusing on equity and access to school gardens – leads me to believe there will be an increased focused on how school gardens can serve the community, physically by providing food as well as socially by encouraging engagement and empowerment. Further research needs to be done to determine whether or not school gardens help students understand where food comes from. As demonstrated by research on community gardens, having an understanding of where food comes from alters consumption behaviors by creating a sense of pride in the grower (Corrigan, 2011) and enforcing the idea of food as a culture necessity rather than a commodity that can be wasted (Valpreda & Zonda, 2016). Additional research should also be done to demonstrate how school gardens could improve the well being of students from low-income neighborhoods. As discussed, research has thus far been conducted in areas that are predominately Caucasian and research has found school gardens are more often found in areas of middle- to high-income. Conversely, research on the LA Sprouts program found that low-income students benefit more from school gardens than middle- and high-income peers (Gatto et al., 2012). Therefore, school gardens can not only be a source to serve the students in most need, but also their respective communities for years to come.

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Curriculum Vitae

Growing up in Baltimore, Cassidy cultivated a passion for giving back to the community. She graduated from the University of Vermont in 2013 with a Bachelor of Science in Animal Science with a concentration in pre-veterinary medicine. During her undergraduate studies, she studied abroad in Namibia, Africa with Round River Conservation Studies. While abroad she researched wildlife populations for the Namibian Ministry of Environment and Tourism, and was a contributing author of the Kunene Regional Ecological Analyses, published in 2012. During her senior year at the University of Vermont, she was a research assistant for a graduate project studying the DNA of *Necturus maculosus* (common mudpuppy) to learn how chemicals within Lake Champlain were affecting the species. Cassidy has worked in various informal and formal education settings. After graduating from the University of Vermont, Cassidy served as the AmeriCorps leader for the Vermont Housing Conservation Board, where she worked with underserved rural populations. Before joining the Reading Partners Baltimore team full-time, Cassidy served her second AmeriCorps term as a site coordinator and helped launch the Francis Scott Key Elementary reading center during the 2014-15 school year. Cassidy is now the development manager for Reading Partners Baltimore and is serving as a Baltimore Corps Fellow focusing on approaching Reading Partners' work and the work of fundraising and development with an equity lens. Combining her interests in education and environmental science she hopes to be an integral part in regenerating our world through conservation campaigns in addition to participating in educational endeavors that will empower the younger generations. Cassidy is expected to receive her Master of Science in Environmental Science and Policy from Johns Hopkins University in May 2017.